IN THE UNITED STATES COURT OF FEDERAL CLAIMS

THE BLACKFEET TRIBE OF THE BLACKFEET INDIAN RESERVATION	))))	
Plaintiff,	))	
v.	))	No. 1:12-CV-00429 L
THE UNITED STATES OF AMERICA,	))	Judge Thomas C. Wheeler
Defendant.	)))	

DECLARATION OF DR. MARK A. FINNEY

In accordance with the provisions of 28 U.S.C. § 1746, I, Dr. Mark A. Finney, declare as follows to the best of my memory and knowledge:

1. I am a Research Scientist employed by the United States Forest Service in the Missoula Fire Sciences Laboratory. Defendant's attorneys have asked me to serve as an expert witness in this case, specifically to rebut the expert opinions of Mr. Darrell Schulte. On March 4, 2016, I submitted an expert report rebutting the opinions set forth in Mr. Schulte's Initial Expert Report.

2. I have reviewed Mr. Schulte's January 7, 2016, Initial Expert Report; his March 4, 2016, Rebuttal Expert report; his April 24, 2015, Declaration in Support of Summary Judgment; the transcript of his May 16, 2016, deposition; the data he submitted to the United States through Plaintiff's counsel on April 29, 2016; and Mr. Schulte's June 1, 2016 report and attached data files.

3. Mr. Schulte based his opinions on computer modeling he performed using a program called FARSITE. FARSITE is a computer simulation program designed to calculate the 2-dimensional growth of wildland fires in complex terrain, fuels, and with varying

weather conditions. I developed FARSITE along with the other programs (known as FlamMap and FSPro) that collectively make up the Wildland Fire Decision Support System (WFDSS) used by fire behavior analysts in all five Federal land management agencies throughout the country.

4. Simulation tools like FARSITE may have predictive value. But that predictive value can be compromised by error. Error in FARSITE can take one of three forms: data error, user error, or model error. These types of error are described in the Frequently Asked Questions for FARSITE, which are available at http://www.firelab.org.

5. Mr. Schulte has admitted that he committed a serious user error in one of the four FARSITE modeled simulations he performed. The error occurred in the simulation of a one-mile-wide fuel break straddling the boundary of Glacier National Park and the Blackfeet Reservation, upon which he based his opinion that his proposed fuel treatments would have stopped or slowed the Red Eagle Fire. In performing that simulation, Mr. Schulte did not enable the "spotting" function in FARSITE. Under the "spotting" function, FARSITE models the effects of wind-borne sparks or embers that may start new fires ahead of the zone of direct ignition by the main fire. Spotting was a primary mechanism through which the 2006 Red Eagle Fire spread. As the result of Mr. Schulte's failure to enable "spotting" in FARSITE, the simulation of his proposed fuel treatment is not an accurate representation of how that proposed treatment would have performed under the conditions of the Red Eagle Fire. Ultimately, because of Mr. Schulte's admitted error, his simulation has no predictive value.

6. In my rebuttal report, I speculated that Mr. Schulte may have improperly modeled spotting in his FARSITE simulations. But I was unable to confirm my suspicions about

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Mr. Schulte's modeling of spotting, and other potential errors in his simulation, because Mr. Schulte did not provide the information on FARSITE user-selected model settings with his Initial Report or in the model input data he supplied. Although Mr. Schulte identified the publicly-available data he relied on in his modeling efforts—such as topographical data and weather data—he did not describe the settings he used to calibrate his simulations through FARSITE's Graphical User Interface ("GUI").

7. These GUI settings include (1) the fire's "Duration," constituting its starting date and time, its ending date and time, and the possible date and time for fuel conditioning (which affects moisture conditions prior to the beginning of the simulation); (2) the "Model Parameters" resolution of the simulation, including distance resolution, timestep (time resolution for fire spread calculations), and visible perimeter interval; (3) the "Fire Behavior" settings, including spotting, the level of growth from spot fires, the percentage of spotting, enabling crown fire behavior, or any ignition delay. Improper calibration of any of these settings could lead to user error that could undermine the reliability and validity of Mr. Schulte's simulation.

8. FARSITE allows a user to create a file that fully describes all simulation settings, including whether spotting is enabled and at what random percentage ignitions occur. This file, known as a Bookmark file, is described in the basic tutorials for FARSITE. Any proficient user knows how to produce a Bookmark file, and will typically produce many of them in the course of a modeling session to save their work.

9. FARSITE also allows a user to produce a simple text file that fully describes the settings used for a given simulation.

10. In addition to unanswered questions about Mr. Schulte's calibration settings governing

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fire behavior, it is difficult to know how Mr. Schulte modified the underlying datasets upon which he based his simulation. In his Initial Report he describes various modifications to fuels in his modeling, which he would have implemented through modifications to the fuel data in the Landscape File (known as an "LCP file"). Although Mr. Schulte generally describes these changes in his Initial Report, it is impossible to discern from that description exactly what modifications he performed. And as I would later learn from data Mr. Schulte disclosed shortly before his deposition, his LCP file does not accurately reflect the changes verbally described in his report. Those irregularities are described below in Paragraph 14 of this declaration.

11. Even if Mr. Schulte's description of his simulation in his Initial Report is completely accurate, there is no way to determine from his description and publicly available data whether he correctly calibrated the simulation to accurately reflect the conditions prevailing during the Red Eagle Fire. This is not a matter of disagreeing with the judgment he exercised in setting those calibration parameters. Rather, there is no way to assess his judgment because he has not disclosed the settings he used. Improper use of these settings, including a failure to properly calibrate them from their default settings, would result in the simulated fire differing substantially from how it would behave in reality.

12. On April 29, 2016, Mr. Schulte provided a disc containing files he relied on in his modeling efforts. The files include input data for the FARSITE simulation for each of his figures, including ignition point (shapefiles), weather file (.WTR), wind file (.WND), landscape file (.LCP), spread rate adjustment file (.ADJ), and initial fuel moisture file (.FMS). Mr. Schulte also supplied several output files for each of his simulations,

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including a shapefile of simulated fire growth which is depicted as a series of line contours of the fire perimeter at different dates and times. These are outputs of FARSITE that Mr. Schulte included in the figures for his report.

13. In reviewing the files on Mr. Schulte's disc, I was immediately struck by the fact that Mr. Schulte did not include a set of Bookmark files or text files of simulation settings to produce a complete record of the simulations. The disc contains a single Bookmark file, titled "barrier_extracted_unmodified_glac04lcp_10days.toa.BMK." I have been unable to open this file, seemingly because Mr. Schulte did not include all the data files necessary for FARSITE to open the file. Based on its location in the disc's directory tree, this Bookmark appears to be related to Mr. Schulte's simulation of his second scenario. It does not appear to be related to his fourth scenario, in which he made his error related to spotting. Without a set of working Bookmark files, or text files of the simulation settings, there is no way to determine what settings Mr. Schulte entered using FARSITE's GUI for each of his simulations.

14. Among the files Mr. Schulte produced on April 29, were LCP landscape files in which Mr. Schulte attempted to implement the fuels treatments described in his Initial Report. I was surprised to find that the fuel level modifications in his LCP file for his Fourth Simulation—a one-mile fuel break straddling the border of Glacier National Park and the Blackfeet Reservation, which is described at page 16 of his Initial Report—did not match the verbal description of that fuel break in Mr. Schulte's Initial Report. Specifically, Mr. Schulte verbally described the fuel break as one that "attempted to mimic a thinning from below or selective cutting that would 'open up' the canopy by increasing the crown spacing to around 14 feet." Schulte Initial Report on page 10. When I examined the LCP

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file I found no changes whatsoever to canopy fuels in the LCP file Mr. Schulte disclosed, which would indicate he did not implement canopy fuel changes as he described them in his Initial Report. I was unable to discern this error until Mr. Schulte provided his input data on April 29.

15. Examining the LCP files for canopy changes revealed another error in Mr. Schulte's modeling. Those canopy changes amount to thinning the overstory trees, which has the effect of removing wind sheltering to the ground surface. Fire spreading beneath the thinned forest would be subjected to much higher winds than the unthinned forest and the fire would thus spread faster. This effect was not represented by Mr. Schulte's simulations, leading him to rely on faulty simulations to support his claim that fuel treatment as he described would reduce spread rates. In effect, by failing to implement the canopy changes described in his report, Mr. Schulte definitely overestimated the efficacy of his proposed fuel treatments. I was unable to discern this error until Mr. Schulte provided his input data on April 29.

16. Examination of the output of Mr. Schulte's simulations from April 29, 2016, reveals additional serious errors which obviate any confidence in his modeling effort and undermine all of his interpretations as to fuel treatment effectiveness. First, the location of the fire was initiated east of Red Eagle Lake, whereas the actual recorded location was more than 1 mile west – on the opposite side of Red Eagle Lake. Second, the date and time associated with the simulated fire perimeters in Mr. Schulte's outputs revealed that he initiated his ignitions on July 26, 2006, two days before the actual start of the Red Eagle fire (July 28, 2006), and that the simulated fires did not reach the boundary of the Blackfeet reservation until one day after the observed July 29th arrival. This means that

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the simulated fire spread was much slower than the Red Eagle Fire was observed to spread in reality and not calibrated to the observed spotting and crown fire behavior, which negates support for treatment effectiveness under the weather and fire behavior conditions actually experienced on the Red Eagle fire. I was unable to discern this error until Mr. Schulte provided his input data on April 29.

17. Having access to the limited set of data Mr. Schulte provided on April 29, 2016, and June 1, 2016, has allowed me to further investigate the validity of Mr. Schulte's simulations. But without a complete set of Bookmark files showing the calibration settings he used, there is still no way to reproduce Mr. Schulte's simulations.

18. Calibration is one of the most important indicators to a modeler that simulation is providing useful and usable output. This process of calibration also is used to reveal to the modeler any possible sources of error in inputs or user-settings. Mr. Schulte admitted in his deposition that, by not enabling spotting, he did not calibrate the simulation to observed behavior of the fire for one of his scenarios. But, as described above, this was not his only error. Without correcting the errors identified above in the fuel maps and ignitions, and without calibration of the simulations to observed behavior of the Red Eagle Fire, Mr. Schulte's simulations are useless and misleading.

19. I have reviewed the supplemental expert report submitted by Mr. Schulte on June 1, 2016. In that report, Mr. Schulte goes beyond merely fixing his error in modeling spotting. He has also modeled the impact of suppression forces on the simulated fire, which he had not done in his previous simulations. There is no logical connection between correcting Mr. Schulte's error regarding spotting and re-running his model to account for suppression resources. Mr. Schulte could re-run his model to correct his error

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without adding the additional, unrelated element of fire suppression modeling. I am unaware of any reason to model fire suppression in correcting this error, except to strengthen the appearance of effectiveness of Mr. Schulte's proposed fuel treatments. Furthermore, modeling of suppression activities on large fires is extremely subjective – requiring speculation on timing, movement, production, and ultimate effectiveness of suppression actions. Because there are no facts regarding hypothetical activities in the hypothetical modeling scenario produced by Mr. Schulte, the results of the suppression modeling are entirely without merit.
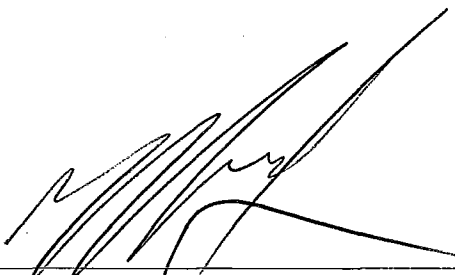
20. In addition to his supplemental report, on June 1 Mr. Schulte provided a disc that contains output files from his new simulation. On that disc, Mr. Schulte provided a plain text file containing FARSITE calibration settings. This is the first time Mr. Schulte has provided any files disclosing any calibration settings. Mr. Schulte does not discuss this text file in his report. I assume the file reflects the settings he used in the new simulations discussed in his June 1 report. However, I have no way of confirming whether that is the case. I also have no way of confirming whether these settings were used in his prior simulations.

21. Mr. Schulte states in his supplemental report of June 1st, 2016 5th paragraph, page 1, "*I used the same landscape files, and the same wind and weather files, and the same adjustment files that I used initial in my first report. No changes were made to any of those files for this scenario.*" But a comparison of LCP files on his original DVD for the corrected scenario depicted in Figure 9 shows a much different treatment area than on the LCP file provided for the supplemental analysis (see attached figure). Thus, Mr. Schulte's statement is false, revealing he changed more than just the spotting and

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suppression in his simulations. The comparison demonstrates that Mr. Schulte has created a larger treatment area in his supplemental analysis than in his initial analysis. Also, the extent and location of proposed treatments shown in Figure 9 (initial report) and Figure 1 (supplemental report) were each different than the actual landscape data used for modeling in either of these scenarios. It is clear from these comparisons that Mr. Schulte has not rigorously defined the area or extent of fuel treatment that he is proposing and thus cannot link his modeling results to any specific proposal for treatment of either Glacier National Park or Blackfeet Reservation lands.

22. I have begun work on a rebuttal report to Mr. Schulte's June 1 supplemental report. Although I believe I can produce a rebuttal by June 15, it will be very difficult to do so, and I may not have time to fully analyze and rebut Mr. Schulte's revised opinion, particularly in light of his decision to model suppression for the first time, which is a complex and fact-intensive issue.

Signed this 6th day of June, 2016.

Dr. Mark A. Finney

Initial Report: GNP modified fuels 10 days.LCP
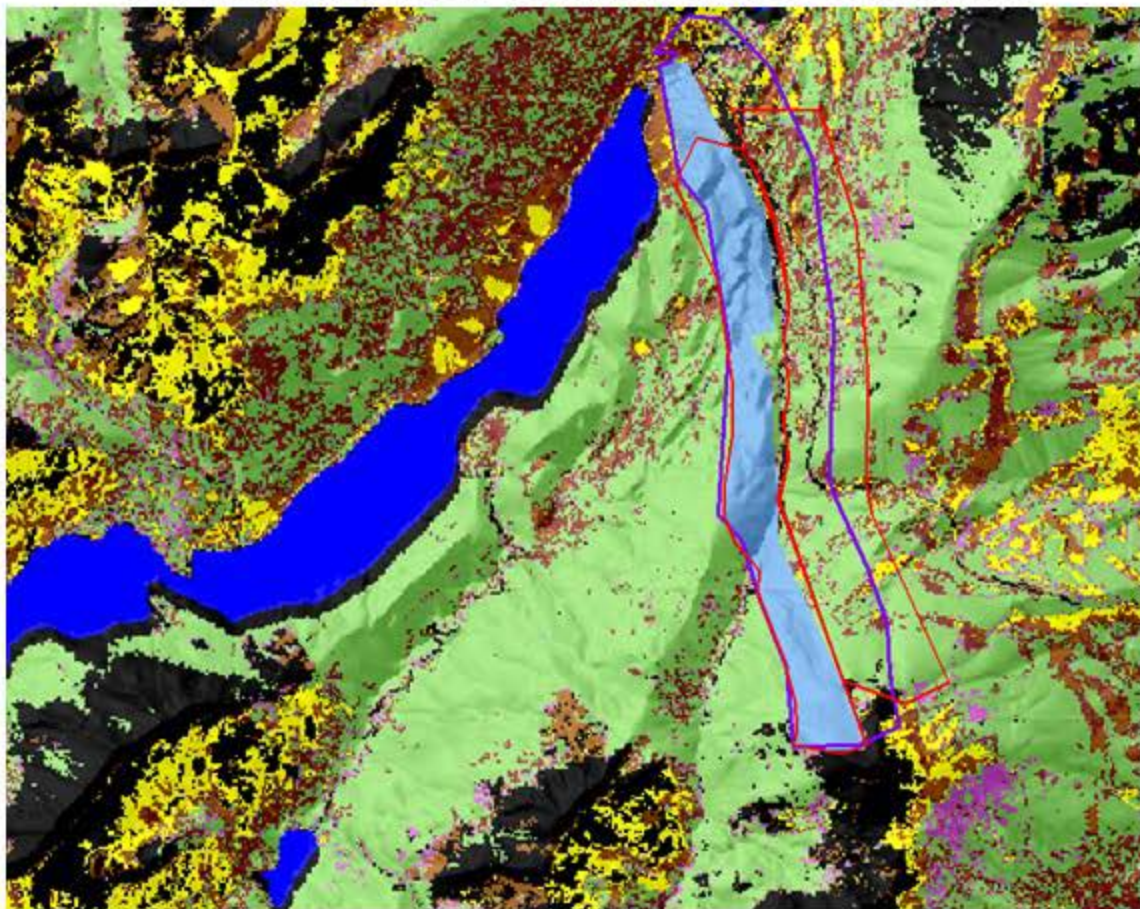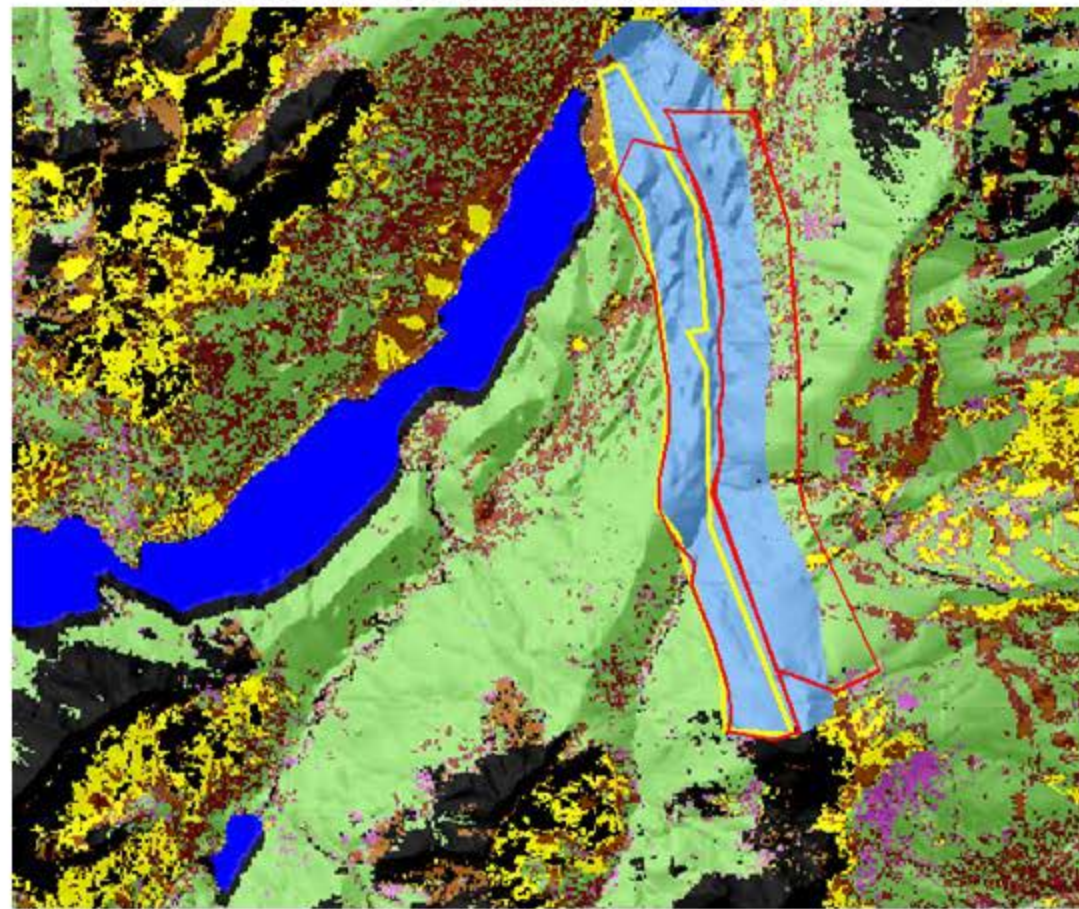
Supplemental: Fully modifiedFM8GNPBFT.LCP

Supplemental Report: Extent of Fuel Treatment In FARSITE File: **FullymodifiedFM8GNPBFT.LCP**

Treatment boundary as depicted graphically in: Initial Report Figure 9; Suppl. Report Figure 1

Initial Report: Extent of Fuel Treatment in FARSITE File: **GNP modified fuels 10 days.LCP**

Supplemental Report: Extent of Fuel Treatment in FARSITE File: **FullymodifiedFM8GNPBFT.LCP**

Treatment boundary as depicted graphically in: Initial Report Figure 9; Suppl. Report Figure 1

Initial Report, Figure 9: Extent of Fuel Treatment In FARSITE File: **GNP modified fuels 10 days.LCP**